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Does strategy matter?

In a changing world with evolving threats, yes, it does



STRATEGIC THINKERS — Teams of people from across Sandia worked the past three years to develop and implement a strategic direction made up of seven priorities to guide the Labs for the next 20 years. Core team members include, from left, Amber Harwell, Tracy Wilbur, Karla Weaver, Kathryn Hanselmann, Scott Holswade, Donna Robertson, John Foley, Rita Gonzales, Elizabeth Roll, Anita Romero O’Brian, Caren Wenner and Danielle Rodriguez. Core members not pictured include Bill Miller, Chrisma Jackson, Amy Shrouf, Gil Herrera and Pam McKeever. **Photo by Lonnie Anderson**

By **Elizabeth Roll**

Google “strategic planning criticism” and a lot comes up. Articles in prominent publications like the Harvard Business Review have titles like “The Big Lie of Strategic Planning,” “The Case Against Strategic Planning” and “The Strategic Plan is Dead.”

Ouch. As a strategic planner, that hurts.

Maybe strategy doesn’t produce results in some business settings, but at Sandia it’s critical, it’s

in our DNA and it’s something of which every Sandian is a part. In a rapidly changing geopolitical world with numerous evolving threats, our role is unique and vital. The superpower race is real. Adversaries of the United States are making sophisticated technical advances that endanger our national security.

How do we stay ahead of our rivals, outmaneuver and out-invent them and avoid technical surprise? This question goes to the heart of our national security and is the reason Sandia exists. In this dynamic environment, it is imperative that

Sandia stewards its work into the future with a thoughtful and significant strategic intent focused on breakthrough ideas for national security.

Seven Labs priorities

That’s where we all come in. Over the past three years, Sandia developed a strategic direction made up of seven priorities to guide the Labs for the next 20 years. It was pinched, pulled, twisted, teased and, finally, sent out into the Sandia world, where

— CONTINUED ON PAGE 5

Quantum Information Edge

Research alliance to advance quantum computing for breakthrough science

By **Troy Rummler**

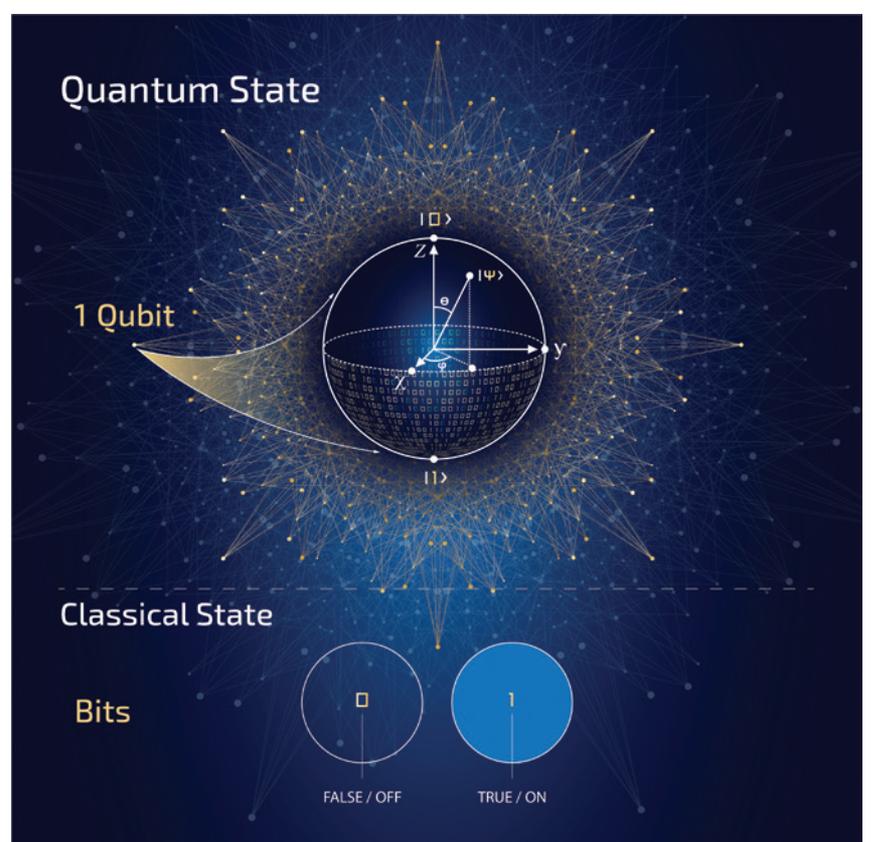
The Quantum Information Edge, a nationwide alliance of national laboratories and universities, has launched to maintain U.S. leadership in next-generation information technology and advance the frontiers of quantum computing systems, which have the potential to make calculations that are far beyond the reach of today’s computers.

The solutions could transform how humans design technology that addresses national and global scientific and engineering challenges, from solar cells to new materials, pharmaceuticals and agricultural fertilizers, and could probe the mysteries of physics and the universe.

Co-led by Sandia and Lawrence Berkeley national laboratories, the Quantum Information Edge strategic alliance brings together expertise in computer science, materials science, physics, mathematics and engineering to pioneer practical advances in quantum systems.

The DOE national laboratories are joined by experts from the University of Maryland; Harvard University; California Institute of Technology; University of California, Berkeley; University of Colorado, Boulder; Massachusetts Institute of Technology; MIT Lincoln Laboratory and the University of New Mexico.

“Through collaboration and innovation focused on tangible technology demonstrations, the Quantum Information Edge will amplify the return-on-investment of quantum research within the U.S. by accelerating progress toward achieving practical quantum computing systems,” said Scott Collis, director of computing research at Sandia.



EDGE EFFECTS — Sandia and fellow member organizations of the Quantum Information Edge alliance are collaborating to transform science and engineering with quantum computing. Quantum bits of information, or qubits, have the potential to make powerful calculations that classical bits can’t. **Image by Michael Vittitow**

Accelerating quantum R&D

Irfan Siddiqi, director of Berkeley Lab’s Advanced Quantum Testbed and a faculty scientist in the lab’s computational research and materials sciences

— CONTINUED ON PAGE 5

Eubank gate project aims to make KAFB more secure

By Karli Massey

Sandians started hearing about a construction project at Kirtland Air Force Base's Eubank gate as early as March last year. Then in October, the appearance of orange barrels and heavy machinery confirmed that the project was real, as work began on a realignment of the 20th Street and G Avenue intersection west of the gate entrance.

Commuters are now preparing for traffic delays and detours along Eubank Boulevard that will start Monday, Feb. 3. During this next phase of the project, scheduled to run through July, construction crews will begin repaving G Avenue. Changes will be made to both inbound and outbound traffic flow at the Eubank gate.

Sandia and NNSA have been collaborating closely with KAFB to manage the 12-month Eubank gate construction project. The majority of those accessing that gate are members of the Sandia workforce. In addition to assisting in traffic flow studies at the gate, Sandia's project management group has led communications efforts about the impacts and proposed mitigations.

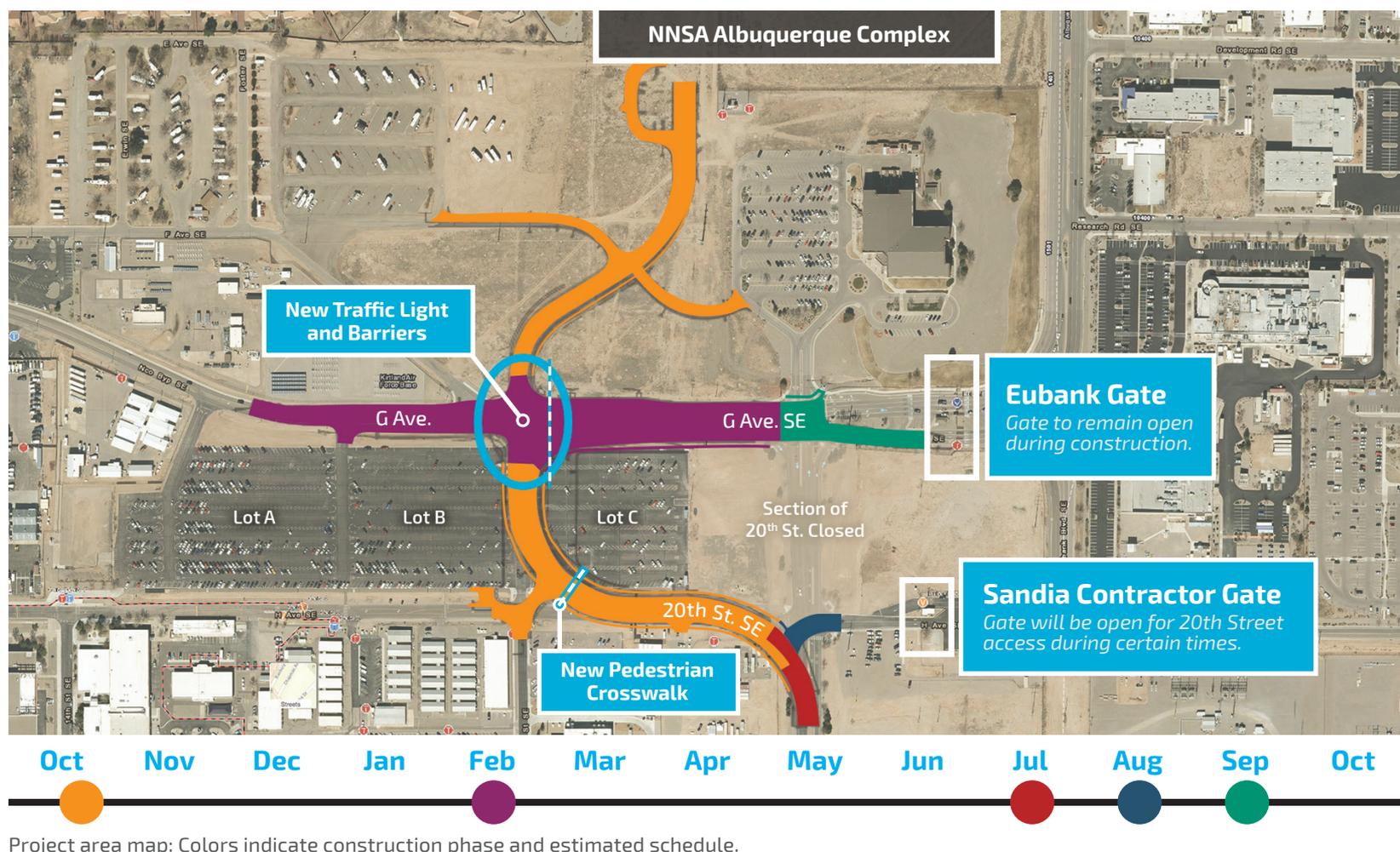
KAFB installation commander Col. David Miller said the purpose of the changes at Eubank gate, as well as other gate improvement projects, is to make the base more secure and improve traffic flow. The \$10.2 million 20th Street and G Avenue realignment project also includes a new roadway to the NNSA Albuquerque Complex, currently under construction.

Roadway construction zone safety tips

- Stay alert and be prepared for unexpected traffic events.
- Slow down and avoid aggressive driving.
- Be respectful of construction workers and gate security forces.
- Be patient and anticipate delays.
- Review plans for traffic flow changes.
- Seek an alternate route.

Miller said the same force protection enhancements that will be added at the Eubank gate are similar to the recently completed project at the Gibson gate. Additionally, a project at the Wyoming gate is now being reviewed for possible initiation in the near future.

Project details are available on the KAFB website and from the KAFB mobile app.



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EDITOR'S NOTE: Lab News welcomes guest columnists who wish to tell their own "Sandia story" or offer their observations on life at the Labs or on science and technology in the news. If you have a column (500-800 words) or an idea to submit, contact Lab News editor Tim Deshler at tadesh1@sandia.gov.

Contact Michelle Fleming to start, cancel or change address for paper subscriptions.
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Legacy of learning, leading



PROUD DAUGHTER — Krystal Kelley shows off photos of her dad, Marvin Kelley, bringing a science experiment to one of her childhood classes and demonstrating a piece of equipment he helped design and build at Sandia.

Photo by Michael Ellis Langley



FAMILY LEGACY — Marvin Kelley and his daughter, Krystal, are proud of the work they've done for Sandia and for the ways they've given back to their community.

Photo by Michael Ellis Langley

By Michael Ellis Langley

Marvin Kelley spent 32 years of his career as a materials scientist, business specialist and technologist at Sandia/California. Now his daughter, Krystal Kelley, is building her own legacy at the Livermore campus.

Marvin walked onto the Sandia/California campus as an employee in October 1979. He was hired to test materials, something he had done across the street at Lawrence Livermore National Laboratory until earlier that year. However, Marvin's path to Sandia had started many years before.

Dream job: Engineer

"What really inspired me to become a technologist or electrical engineer was Mission: Impossible (TV show), because there was a black electronics engineer working on the show — Greg Morris," Marvin said, recalling his upbringing in Oakland. "He would do these amazing things. He was behind the scenes, but he would create a portable hovercraft that could fly into Soviet airspace, take pictures and send them to the rest of the Mission: Impossible team."

When Marvin was 13 or 14, his father, who worked at the Alameda Naval Air Station, brought home an electronics manual for his curious son.

"I was in the 8th grade at that time and just consumed it. Loved it," Marvin said. "That manual was the water in the cement. Without that, it just would have been lost potential. The manual was the catalyst."

In high school, two teachers — Mr. Brown and Mr. Cleveland, who taught electronics and physics — fueled the fire.

"My goal — my dream — became to be an electronics engineer. I studied electronics and physics — whatever would position me to reach my dream," Marvin said. "They were instrumental in taking me to the next level. They took it upon themselves to see that I succeeded. They were very integral to my pursuit. When I tried to do substandard work, they would kick it back: 'Marvin, do it again. You can do better.'"

When a recruiter from LLNL visited Castlemont High School, he offered Marvin the first chance to make his dream come true.

"We'd like to have you work full-time," Marvin recalls with tears in his eyes. "Wow." He worked during the day at LLNL and went to Laney College at night to obtain his science degree.

Childhood fueled by curiosity

Krystal remembers an inquisitive childhood, fueled by her dad's passion.

"When I was a kid, he brought home robot kits. The first time we did one, we worked together on it. 'I'll show you how to do it — and the next one, you do it yourself,' he said. I was dissecting a cow's eyeball at the Exploratorium at the age of 6, and

what my dad didn't know is that I was also taking my toys apart upstairs at our home to try and figure out how they worked," Krystal said.

"Other things he would bring home were chemistry sets, and when I got to school, I was part of the G.A.T.E. (Gifted and Talented Education) class," she said, adding that her dad would visit her classrooms with science experiments demonstrating topics like magnetic levitation to educate her and her classmates.

Forging a new path

In 1990, Marvin wanted to move into the analytic side of project management at Sandia to help ensure that the mission he was a part of would be carried out efficiently and successfully. So he asked for something that didn't yet exist.

"I went to my department manager and said, 'I would like to get a degree in statistics so I can apply designed experiments to the work that we're doing here,'" Marvin said. His manager agreed, and Sandia supported him by helping pay for his education. "It wasn't formalized. It was a case of 'We'll make it happen.' I felt overwhelmed. Joyful. So I worked during the day, up to a certain time, and then went off to Cal State Hayward and studied statistics with a business minor — with the caveat that I would keep a 3.27 GPA."

Marvin was one of the first recipients of what became Sandia's Tuition Assistance Program, which Krystal would later help support after being hired as a Sandia contractor in 2004.

"Before six months had passed, Sandia offered me a permanent position," Krystal said, adding that she secured the role by applying the mindset she learned as a child to take things apart and see how to make them work better. "People here are pretty open to hearing a different perspective on something and taking into consideration how that might work. Things can get piloted and done a different way."

Role model and volunteer

Krystal, now a part of Sandia's procurement team, has also followed in her father's footsteps outside Sandia by positively impacting the lives of students in the local community, just as her father did in her classrooms when she was growing up.

"As a volunteer at Citizen Schools with Sandia, I would travel to Oakland and help out," she said. "I was working with a lot of kids that were tough to deal with, and they were kind of left behind. I wanted to show them my life as a black woman — that I'm doing things — so they could see the life we're able to live and the things we're able to do and give back. And hopefully be like Greg Morris — serve as an example of 'You can do this.'"

Krystal also took part in the Expanding Your Horizons program in San Joaquin County, mentoring young women in STEM.

"I want these kids to be able to envision a different future," she said. "I want them to know there's something more. It's so easy to get caught up in what you see each day; most kids are not thinking beyond next week."

Marvin said during his career he also wanted to make sure everyone had a voice at Sandia/California, so he helped found the Labs' African American Outreach Committee. Now retired, he continues to volunteer in local classrooms, hoping to instill in kids the curiosity and drive to achieve that he possessed as a young man and that he passed on to his daughter.

Sandia community outreach

Sandia offers many opportunities to get involved in our communities and make a difference in the lives of our friends and neighbors. For more information, see Sandia's Community Involvement website at sandia.gov/about/community.



LEVIOSA — Marvin Kelley shows kids in his daughter Krystal's class an experiment demonstrating magnetic levitation for trains.

Photo courtesy of Marvin Kelley



MATERIALS TEST — In the early 1980s, Marvin Kelley showed off the Automatic Multi-axis Ultrasonic Scanner, or AMUS, that he helped design and build to test materials at Sandia.

Photo courtesy of Marvin Kelley

A material benefit to society

Sandia scientist elected 2019 AAAS fellow

By **Troy Rummler**

Sandia senior scientist Tina Nenoff, a perennial inventor of advanced materials, has been elected fellow of the American Association for the Advancement of Science.

Tina was bestowed the honor by her peers for the advancement of science “in service to society” and “for outstanding accomplishments in nanoporous materials and technology through research and group effort leadership, particularly in ion and gas separations for energy and environmental applications.”

In other words, she creates materials that adsorb (adhere to), trap or react with specific chemicals, removing them from their surroundings. These materials, generally designed with nano-sized pores, are called zeolites and metal organic frameworks, or MOFs.

Tina and her team have focused recently on designing, synthesizing and using one such material as a sensor to detect hazardous nuclear fission gases, such as iodine, and trigger an alert.

Radiological iodine isotopes are produced at nuclear reactors and can be released into the environment during an accident. Iodine gas travels easily through air and water and combines quickly with other elements, posing a health risk for people who live or work nearby. But a small, palm-sized device, similar to a smoke detector, could alert residents to the danger of an iodine release.

The detector in development is enabled by these nanoporous materials (in this case, MOFs), which have ultra-high selectivity to only the iodine gas. The MOF will adsorb the iodine gas particles; when that happens, the material generates an electrical signal that serves as the trigger for an alert.

Tina and her team have published multiple papers on the development of the sensors, most recently in the journal *ACS Applied Materials & Interfaces*, in which they describe a reversible sensor — one that can use heat to reverse the process, releasing the iodine to enable multiple cycles of measurements.

Putting advanced materials to work

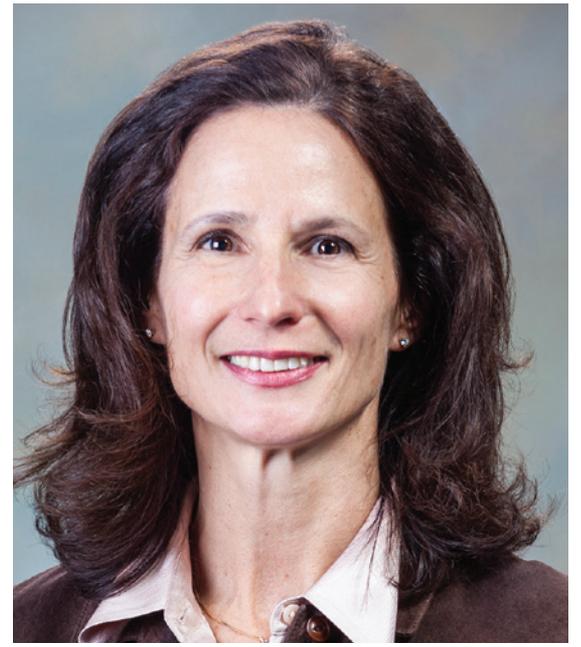
Tina has made a career of applying advanced materials to large-scale problems, affecting many industries with her work.

According to the U.S. Energy Information Administration, about 23% of the energy generated in the country is used for industrial purposes. Advanced materials can help replace energy-intensive processes, like cryogenic petrochemical separations, with more efficient ones.

“Petroleum is a combination of a large number of chemicals, but you only need a handful of them as starting materials (or feedstock chemicals) to make commercial products,” Tina said. She and her team have combined high-performance computing with advanced-materials synthesis, characterization and testing to successfully custom-design materials and membranes to efficiently separate target feedstock chemicals.

In another example, Tina and her team have produced cost-effective silica filters that enable industries to reduce water consumption, freeing it for use as drinking water or in agricultural production. This is vital, as U.S. power plants use about 500 billion gallons of freshwater a day, much of it for industrial cooling. These novel materials allow water to be recycled without silica building up in the piping, which can damage machinery.

In 2011, Tina and now-retired Sandia geochemist Jim Krumhansl aided the decontamination effort at the Fukushima Daiichi nuclear power



ADVANCED SCIENCE — Tina Nenoff, a materials and senior scientist at Sandia, has been elected fellow of the American Association for the Advancement of Science.

Photo by **Stephanie Blackwell**

plant in Japan after a massive earthquake and tsunami severely damaged a number of its reactors. Officials used a Sandia-designed molecular sieve, crystalline silico-titanate, tailor-made to separate radioactive cesium ions from the seawater. The material was used to clean more than 160 million gallons of radioactive water that had been pumped into the damaged plant to cool the reactors.

Real-world impact keeps Tina excited about her work, but she credits dynamic, cross-disciplinary teams at Sandia for making it possible. Any given project can include computer scientists, geoscientists, materials scientists (like herself), chemical engineers and technology transfer specialists.

“You can probably do that anywhere,” Tina said, “but it’s really easily accessed and valued at a place like Sandia.”

Tina will be recognized with other fellows at the AAAS Annual Meeting on Feb. 15 in Seattle, Washington.

Four Sandia scientists elected AIAA associate fellows

Story by **Michael J. Baker**
Photos by **Lonnie Anderson**

Sandia scientists Jacqueline Chen, Tucker Lavin, Humberto Silva III and Justin Smith have been elected associate fellows by the American Institute of Aeronautics and Astronautics.

The designation of associate fellow recognizes those “who have accomplished or been in charge of important engineering or scientific work, or who have done original work of outstanding merit, or who have otherwise made outstanding contributions to the arts, sciences, or technology of aeronautics or astronautics,” according to an institute news release.

To be selected as an associate fellow, an AIAA senior member must be in good standing, with at least 12 years’ professional experience, and be recommended by a minimum of three other associate fellows.

Jackie, Tucker, Humberto and Justin were formally honored and inducted as associate fellows along with 129 others at the AIAA SciTech Forum in Orlando, Florida, in January.



Jacqueline Chen
Photo by **Randy Wong**

Jacqueline Chen

Jackie is a computational combustion scientist who performs first principles numerical simulations of turbulent reacting flows on peta-scale supercomputers, examining fundamental interactions between turbulence and the chemistry of combustion

processes relevant to engines for transportation, power generation and propulsion.

She has a doctorate in mechanical engineering from Stanford University and has spent her

entire career working in Sandia’s Combustion Research Facility. Jackie was elected a fellow of the American Physical Society and the Combustion Institute in 2018, after being inducted earlier that year to the National Academy of Engineering.

She is a past recipient of a DOE INCITE Award, Society of Women Engineers Achievement Award, Combustion Institute Bernard Lewis Gold Medal Award, Asian American Engineer of the Year Award and Sandia’s O.W. Adams Award.



Tucker Lavin

Tucker Lavin

Tucker, an engineer whose focus is aerodynamics and flight mechanics, has made important contributions in all aerodynamic-related aspects of vehicle design, development and fielding of cutting-edge systems.

During Tucker’s time at Sandia, he has had key responsibilities in the development of the aerodynamic models for several flight systems and has led flight safety analysis efforts to ensure safe test execution.

Tucker also serves as a subject matter expert, providing development support to other government agencies and to Sandia’s mission-level assessments of aerospace systems. He has a master’s degree in aerospace engineering from Texas A&M University.

Humberto Silva III

Humberto is a thermal scientist and engineer involved in both computational and experimental research and development. He specializes in conduction, convection, radiation, chemical kinetics, verification and validation, uncertainty quantification and design of experiments.

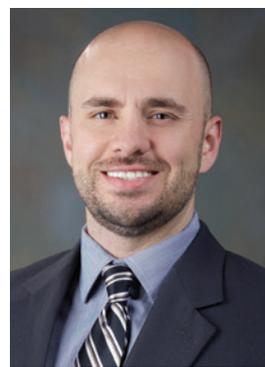


Humberto Silva III

Humberto is also an Accreditation Board for Engineering and Technology evaluator for aeronautics and astronautics engineering programs and an adjunct professor in the Mechanical Engineering Department at the University of New Mexico, where

he has taught various courses and advised multiple theses.

He has a doctorate in aerospace engineering from Arizona State University and was previously a high school physics teacher in his hometown of El Paso, Texas.



Justin Smith

Justin Smith

Justin is a Sandia aerosciences manager. He leads computational and experimental research and development spanning the incompressible to hypersonic regimes.

He was lauded for significant contributions to critical national security programs through experimental and computational research in compressible aerodynamics, hypersonic reentry, laminar-to-turbulent boundary layer transition and fluid and structure interactions.

Justin has a bachelor’s degree in physics from the University of Northern Iowa and a master’s degree in science from the Aeronautical and Astronautical Engineering Department at Purdue University.

Does strategy matter?

CONTINUED FROM PAGE 1

people like you took it and turned it into something solid. It climbed off the pages and became actions that impact the way we do our jobs.

Each priority has a team behind it, working to implement the strategy. The Sandia Lab News recently concluded a series of columns, each featuring a different priority and written by an associate Labs director champion who explored and explained its vision, goals and activities. They stopped short of patting themselves on the back.

That's what I want to do here. I want you to know that teams have brought these priorities to life and accomplished plenty. Projects are happening, data is being collected, changes are being made. Most importantly, the work continues.

Here are key accomplishments from the past year:

Maintain an agile and effective nuclear deterrent. The team summarized key technical challenges across all the areas it touches. Five major areas were identified: agile testing, hostile environments, resilient barrier designs, trusted and survivable logic structures and data management. Plans are being developed to push those areas forward in fiscal year 2020 and beyond. The team's work will dovetail with the Labs' Nuclear Deterrence 3.0 strategy.

Anticipate threats to national security through intelligence science. The team developed a technical framework for thinking about complexity science and identified three critical areas: human systems

theory, data analytics and decision science. The framework, which was validated through a targeted case study, will be used to screen, select, evaluate and refine potential R&D and science questions.

Develop transformational technical solutions to detect threats to national security. Two primary objectives were addressed: understanding gaps in detection capabilities and understanding R&D needs for development and deployment of adaptable and reconfigurable sensors and sensor architectures. The team conducted brainstorming sessions with subject matter experts across the Labs to collect diverse input and sponsored an effort to identify credible scenarios for improved threat detection.

Invent and demonstrate pathfinder systems to address threats. A team that crosses mission areas and Labs strategic priorities used its broad knowledge to come up with a list of seven viable pathfinder ideas. It developed a set of principles for selecting candidate pathfinder systems and is now working with programs to integrate the pathfinder ideas into our technical work.

Deploy outstanding engineering, science and technology to our missions. Deep dives were done into several topical areas: Assessing the impact of geoenvironment; Inherently safe, resilient, modular nuclear weapons; Mission impact of Z-next beyond NW; Non-nuclear strategic weapons; and From bits to brilliance. About 100 people Labs-wide participated in workshops in each area, producing white papers that will become research initiatives sponsored by associate Labs directors.

Unleash the power of Sandia. Four strategic pillars for unleashing Sandia's power were identified: operational effectiveness, creative thinking and innovation, empowered workforce and exceptional institution. The team developed a near-, mid- and long-term roadmap to implement cultural changes that will remove barriers and improve agility and decision-making. This team's work directly informed the fiscal year 2020 strategic goal to "radically improve how we deliver the mission" and several other Labs-level objectives.

Engagement across the Labs

Sandia's strategy touches all organizations and reflects the local character and expertise of our rich and diverse portfolio of technical and operational activities. Labs leadership plays a key role in strategy, and we look forward to the engagement of our new laboratories director, James S. Peery.

We move toward this future together through the decisions we make. Big and small, they influence our behaviors and impact how Sandia delivers. In everything we do — strategy, operations, processes and people — we must keep an eye on the horizon and move the Labs ever closer to the tomorrow we envision. Initiatives and activities are driven by the desire to position the Labs for the years ahead.

Everyone's help is needed to make Sandia's strategy ever more inclusive. Employees can visit strategicplan.sandia.gov or email the strategy team at strategy@sandia.gov to get involved.

What we do today will keep us ready when duty calls — now and 20 years from now. 

BLACK HISTORY MONTH

February 2020

Remember & Celebrate

Black History Month Celebration, BLC-inspired lunch menu

When: Wednesdays & Thursdays
Time: 11 a.m.-2 p.m.
Location: Taher Café, Bldg. 861

Lego Drive

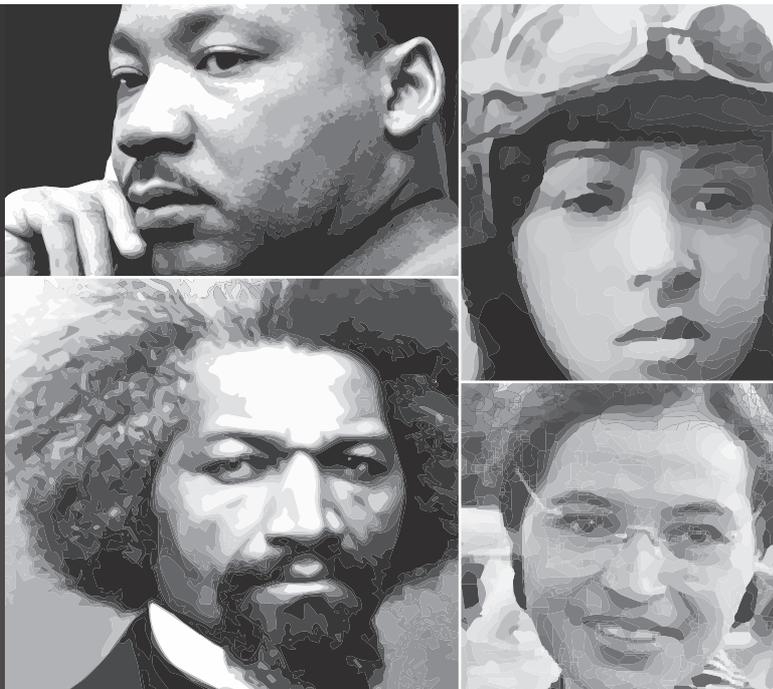
When: Wednesday, Feb. 5
Time: 11 a.m.-2 p.m.
Location: Taher Café, Bldg. 861

Diversity Cinema: African Americans and the Vote

When: Tuesday, Feb. 25
Time: Noon-1 p.m.
Location: Steve Schiff Auditorium, Bldg. 825

BLC welcomes all members of the workforce to join the community and volunteer on subcommittees.

wp.sandia.gov/blc



CONTINUED FROM PAGE 1

divisions, said, "We are at the threshold of significant advances in quantum information science. To break new ground, the Quantum Information Edge will accelerate quantum R&D by simultaneously pursuing solutions across a broad range of technology areas and integrating these efforts to build working quantum computing systems that benefit the nation and science."

The alliance will identify the most significant science applications that stand to benefit from quantum computing, engineer the hardware and software to run these applications and develop methods to verify that the applications have achieved quantum advantage — meaning they can solve problems faster than classical computers.

"If we imagine a world with ubiquitous access to quantum computing, what types of problems could we solve, and could we obtain solutions faster or otherwise better than with classical computing alone? We are developing theory and algorithms to address such questions," said Sandia computer scientist Ojas Parekh.

The alliance will advance quantum processors using several hardware approaches, including superconducting, trapped ion and trapped atom quantum bits (or qubits). The alliance will explore how to suppress noise and errors, which severely degrade computing performance, in multi-qubit quantum processors, and will develop new computing algorithms to control qubits and engineer new techniques to fabricate them. Theoretical computer scientists, physicists and chemists will help understand how best to apply these systems to important scientific problems.

The team will also help grow the workforce needed to keep the nation at the forefront of quantum information science for years to come, share its advances with the broader scientific community to drive the innovation ecosystem and work with industry to translate promising technologies into real-world applications.

"Among the applications that are important are accurate simulations of molecules and materials, which are central to many aspects of Sandia's national security mission. Sandia has also developed working qubits in multiple technologies, and we believe it will be critical moving forward to couple knowledge of important applications with an understanding of how quantum devices work and can improve," said Rick Muller, senior manager for Sandia's quantum information science programs. 

“The life of a nation is secure only while the nation is honest, truthful, and virtuous.”

Frederick Douglass




Quantum information

CONTINUED FROM PAGE 1

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Recent Patents

July — September 2019

- **Constantin Brif, David Rushton Farley, Mohan Sarovar and Daniel Beom Soo Soh:** Secure fiber optic seals enabled by quantum optical communication concepts. Patent #10341015
- **Paul Davids and Anthony L. Lentine:** Transceivers and receivers for discrete-variable quantum key distribution. Patent #10341096
- **Dorina F. Sava Gallis, Jeffery A. Greathouse and Tina M. Nenoff:** Compositions, systems and methods for selective porous material oxygen separation. Patent #10343141
- **Mark C. Grubelich and Jiann-Cherng Su:** Deployable centralizers. Patent #10344542
- **Giorgio Bacelli, Ryan Geoffrey Coe and David G. Wilson:** Pseudo-spectral method to control three-degree-of-freedom wave energy converters. Patent #10344736
- **Mark Daniel Rintoul and Andrew T. Wilson:** Trajectory analysis with geometric features. Patent #10345106
- **Mary M. Moya and Roger Derek West:** Reduced-bias multi-resolution coherent change detection. Patent #10345440
- **Clifford K. Ho:** Solar receivers and methods for capturing solar energy. Patent #10348241
- **Scott Kiff:** Neutron multiplicity detector control circuitry and firmware. Patent #10353088
- **Igal Brener and Michael B. Sinclair:** Active optical device apparatus enabled by dielectric metamaterials. Patent #10361250
- **David G. Wilson:** Controller for a customized electric power storage device in a collective microgrid. Patent #10374430
- **Abraham Anthony Clements, Jason Hamlet, John Mulder and Alexander Roesler:** Backplane filtering and firewalls. Patent #10375106
- **Jiann-Cherng Su:** Fluid driven drilling motor. Patent #10385616
- **Gabriel Carlisle Birch, Amber Lynn Dagel, John Clark Griffin, Charles Frederick LaCasse IV, Christian Turner and Bryana Lynn Woo:** Computational optical physical unclonable function. Patent #10387660
- **Andrew A. Allerman, Andrew Armstrong, Albert G. Baca, Erica Ann Douglas, Robert Kaplar and Carlos Anthony Sanchez:** Regrowth method for fabricating wide-bandgap transistors, and devices made thereby. Patent #10388753
- **Christopher Lee Kelley and David Charles Maniaci:** Wind turbine blades, wind turbines, and wind farms having increased power output. Patent #10400743
- **Stephen Buerger, Avery Ted Cashion IV, Mikhail Mesh, David W. Raymond and Jiann-Cherng Su:** Variable rate compliance modules, assemblies and tools for suppression of drilling vibrations. Patent #10407998
- **Edward G. Winrow:** Monolithic flexured mirror mounts. Patent #10409030
- **Abraham Anthony Clements, Mark Walter Learn and Jorge Mario Urrea:** Control system backplane monitoring with fpga. Patent #10409274
- **Robert C. Armstrong, Vivian G. Kammler and Jackson Mayo:** Fpga/asic framework and method for requirements-based trust assessment. Patent #10409994
- **Christopher D. Jenkins and Alexander Roesler:** Intrusion detection apparatus, system and methods. Patent #10410002
- **Nelson S. Bell and Nancy A. Missert:** Lithium battery cathode. Patent #10411251
- **Giorgio Bacelli, Ryan Geoffrey Coe and David G. Wilson:** Model predictive control of parametric excited pitch-surge modes in wave energy converters. Patent #10415537
- **Matthew G. Blain, Peter Lukas Wilhelm Maunz, Christopher Nordquist, John F. Rembetski, Paul J. Resnick and Jonathan David Sterk:** Ion trapping for quantum information processing. Patent #10418443
- **Michael N. Rector:** Centrifuge with vector-seeking linkage. Patent #10421081
- **Tod Tracy Amon, Edward Steven Jimenez Jr. and Kyle R. Thompson:** Three-dimensional radiograph security system. Patent #10365396 B2
- **Cy Fujimoto:** Poly(phenylene)-based anion exchange polymers and methods thereof. Patent #10370483 B2
- **Michael T. Dugger, Rand Garfield and Brendan L. Nation:** High sensitivity bearing tester and systems thereof. Patent #10371598 B1
- **Igal Brener, David Bruce Burckel, Salvatore Campione, Paul J. Resnick and Michael B. Sinclair:** Rapidly tunable, narrow-band infrared filter arrays. Patent #10393933 B2
- **Ryan Wesley Davis, John Michael Gladden and Benjamin Chiau-Pin Wu:** Terpene synthases for biofuel production and methods thereof. Patent #10400254 B1
- **Timothy J. Boyle and Bernadette A. Hernandez-Sanchez:** Single-source synthesis of ceramic oxide nanoparticles. Patent #10407347 B2
- **Tod Tracy Amon, Edward Steven Jimenez Jr. and Kyle R. Thompson:** Computed tomography object inspection system. Patent #10410331 B2
- **Thomas Edwin Beechem III, Khalid Mikhiel Hattar, Douglas L. Medlin, Edward S. Piekos and Luke Yates:** Ion-implanted thermal barrier. Patent #10418304 B2
- **Giorgio Bacelli and David G. Wilson:** Multi-resonant feedback control of a single degree-of-freedom wave energy converter. Patent #10423126 B2

Note: Patents listed here include the names of active Sandians only; former Sandians and non-Sandia inventors are not included.

Following the listing for each patent is a patent number, searchable at the U.S. Patent and Trademark Office website (www.uspto.gov).

SANDIA CLASSIFIED ADS

NOTE: The classified ad deadline for the Feb. 14 issue of Lab News is noon Friday, Feb. 7.

AD SUBMISSION GUIDELINES

AD SUBMISSION DEADLINE: Friday noon before the week of publication unless changed by holiday.

Questions to Michelle Fleming at 505-844-4902.

Due to space constraints, ads will be printed on a first-come, first-served basis.

Submit by one of the following methods:

- **EMAIL:** Michelle Fleming (classes@sandia.gov)
- **FAX:** 505-844-0645
- **MAIL:** MS1468 (Dept. 3651)
- **INTERNAL WEB:** Click on the News Tab at the top of the Techweb homepage. At the bottom of the NewsCenter page, click the "Submit a Classified Ad" button and complete the form.

AD RULES

1. Limit 18 words, including last name and home phone (web or email address counts as two or three words, depending on length).
2. Include organization and full name with ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. The same ad may not run more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce and retired Sandians only.
10. Housing listed for sale is available without regard to race, creed, color or national origin.
11. Work wanted ads are limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in poor taste.

MISCELLANEOUS

BREWING EQUIPMENT: 1/2-hp SS pump, 3 ea.; 15.5-gal. kegs, 3 ea.; carb stones, 7 ea.; 1.5-in. SS butterfly valves; 1.5-in. SS tri-clamps, more. Lee, 505-350-2809.

IKEA CLOSET SYSTEM, w/all pcs., drawers, shelves, text for photos, \$200 OBO. North, 505-715-7430.

ROOF CARGO BOX, Thule Sidekick, rarely used, excellent condition, \$75 OBO; Schwinn Pro spin bike, older model, great condition, \$100 OBO. Haass, h3haass@gmail.com.

VINTAGE HUMMEL FIGURE, Boy Reading with Dog, 1955, #306, \$20. Kaplan, 505-270-7425.

DINING TABLE, Victorian, oak, 43" x 43-3/4" w/3 leaves, 5 ribbed legs, excellent condition, \$500. Feibelman, 505-242-1946.

DECORATIONS, wedding reception & ceremony. Castle, 505-550-6664, ask for Nancy.

WORKBENCH, Craftsman, 48" x 20-1/2" top, 4 drawers, 2-door covered shelves, \$90. Hietala, 505-610-1252.

CHINA, Queen Anne pattern by Nagoya Shokai, 12 cups & saucers, free. Dennett, 505-379-9971.

TV STAND, 20-1/2"W x 58"L x 18"H, glass/metal, Roccio, \$140 OBO. Weagley, 505-385-4059, leave message.

BEDROOM SET, oak, king size, panel bed w/large chest, dresser w/winged mirror, excellent condition, photos available. Edmund, 505-453-1953.

ETCHED GLASS PUNCH BOWLS, 2, 13-in. & 9-in. diameter, 24 cups, ladle, photo available, \$40. Williams, 505-271-4902.

TRANSPORTATION

'04 JEEP GRAND CHEROKEE, lifted, new engine & transmission (2019), winch & metal bumpers, \$10,000 OBO. Young, 505-688-7559.

'03 CHEVY VENTURE LT, 128K miles, good condition, runs great, lots of miles left, \$1,700. Bossert, 505-293-3166.

'13 NISSAN PATHFINDER SV, Sport Utility, 2WD, 4-dr., 3rd-row seating, seats 7, 131K miles, runs great, \$9,700. Padilla, 505-620-1461.

'11 CAMARO 2SS, Borla exhaust, heated leather, loaded, garaged, rarely driven, <62K miles, like new, \$17,800 OBO. Theobald, 505-980-8660.

WANTED

VOLUNTEERS, help rescued cats, Fabulous Felines charity, fabulousfelines.org. Stubblefield, 505-263-3468.

Mileposts



*New Mexico photos by Michelle Fleming
California photos by Randy Wong*



Jerry Boyd 40



Jeff Zirzow 40



Anthony Perlinski 35



Paul Vrabel 35



Richard Wickstrom 35



Troy Delano 30



Beth Dick 30



Jay Dike 30



Glen Jensen 30



Joe Michael 30



Jim Pacheco 30



Rick Ramirez 30



John Aidun 25



Ron Goeke 25



Chris Northrop 25



Jon Salton 25



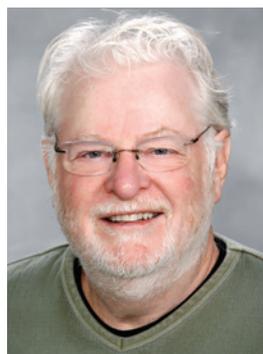
Stephanie Willis 25



Ellan Anderson 20



Miquelita Carrion 20



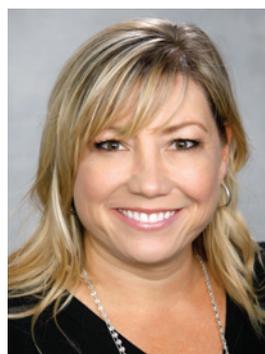
Robert Clay 20



Jean-Paul Davis 20



Patricia Sena 20



Mindy West 20



Bridget Clevenger 15



Justin DuBois 15



Helena Jin 15



Joe Lyle 15



David Mackovjak 15



Randy McClelland-Bane 15



Mark Murton 15



Charlie Robert 15



Kayla Terry 15



Tri Trinh 15



Jason Wilke 15

Recent Retirees



*New Mexico photos by Michelle Fleming
California photos by Randy Wong*



Jay Clise 30 Nancy Clise 26



John Darby 20



Carla Bell 17

Dr. King's vision still inspires hope

UNM law professor speaks to personal missions at Labs' Martin Luther King Jr. Day event

By **Luke Frank**

Audience members leaned forward in their chairs as they listened to UNM law professor Sonia Gipson Rankin speak about Martin Luther King Jr.'s work during Sandia's MLK 2020 Celebration and Day of Reflection at the Steve Schiff Auditorium on Jan. 20.

Rankin, a researcher and recognized expert on laws and their impacts on America's black communities, was invited by Sandia's Black Leadership Committee to speak at this year's event.

The celebration opened with a performance of the American national anthem by Sandia's Juanita Evans, followed by the playing of the black national anthem, "Lift Every Voice and Sing." After a brief prologue by Deputy Labs Director Dori Ellis, Rankin immediately captured the room with her presentation, "Arcing Toward Justice: Dr. King's 2020 vision."

Rankin recalled vividly the time she visited Washington, D.C., and stood just below the Lincoln Memorial on the very spot where Dr. King gave his famous "I have a dream" civil rights speech. "I remember how impactful that was for me," she said, "thinking back to what it must have looked and felt like that day."

Rankin talked about Dr. King's last sermon before his assassination, citing a quote that served as the basis of her presentation: "We shall overcome, because the arc of the moral universe is long, but it bends toward justice."

"Arcs are about movement related to a path," Rankin said. "Scientists can relate to that, right? That's what Dr. King's mission was, an arc that continues moving down a path borne of personal passion. His mission was about membership — being accepted as a voice in society."

She challenged the audience to look within for personal passion — something they would be doing if they didn't have to work. Hers is telling the story of Black America. "Your passion informs your personal mission," she said.

Rankin cautioned that we should be aware of hidden predispositions within ourselves in our undertakings as citizens and Sandians. "Implicit bias is so deeply ingrained as part of our core beliefs that even if we recognize it, we can't say where it came from," she said. "We need to recognize and counter it, both through education and legislation."

"Let's take artificial intelligence for example," Rankin said. She talked about the remarkable progress in developing algorithms used for applications like a GPS in your car and the functionality of social media. "But," she said, "right now, AI has the sense of an 18-month-old."

"It's gotten some things right, like driving directions and Snapchat functionality, but AI is bigger than that," Rankin said. "Artificial intelligence is off in other algorithms, like those that decide credit ratings, employment screenings, student loans and admissions. Algorithms are powerful tools, but we still need that human element — humanity — in designing them for things like healthcare eligibility and prison recidivism. Our code writers have an incredibly important and difficult job to keep data and algorithms unbiased."

"Things seem great right now; the economy's strong, the stock market's up, unemployment is down, there's a large decline in blacks in our prisons," Rankin said. "Yet we still have the highest suicide rate in the U.S. that we've had in a long time." Suicide rates have increased in nearly every state over the past two decades, and half of the states have seen suicide rates go up more than 30%, according to the Centers for Disease Control and Prevention.



MORAL UNIVERSE — UNM Law Professor Sonia Gipson Rankin captivates her audience in the Steve Schiff Auditorium during her presentation at the Labs' MLK 2020 Celebration and Day of Reflection on Jan. 20. **Photo by Lonnie Anderson**

Rankin's words encouraged the audience to have hope. "So things look right but don't quite feel right," she said. "This is something MLK predicted: that we should look for a massive act of conscience."

"It won't feel right, but it's going to get right," she said. "That's the arc to which Dr. King referred and the reason his principles still live today, no matter the time or circumstance." <#>

Hearts and Soles begins Feb. 3

Donations needed for Albuquerque students

By **Stephanie Holinka**

Sandia's annual Hearts and Soles program (formerly Shoes for Kids) is gearing up to provide much-needed shoes for Albuquerque Public School children.

Between July and December 2019, the APS Clothing Bank distributed 1,076 shoes or vouchers to students in the community who urgently needed shoes.

"Last year at this time, the Clothing Bank had more than 200 students on their waiting list. Thanks to the generosity of Sandia staff donation last year, the Clothing Bank currently has no waiting list," said APS Volunteer Programs/Special Projects Manager Vaisu Desai Bronk.

The program also benefits from its partnerships with Big 5 Sporting Goods, who provides the shoes.

"The Clothing Bank's partnership with Big 5 allowed it to work with local area managers to obtain bulk orders of shoes in various sizes, which are kept in stock at the Clothing Bank," Bronk said. "Big 5 also provides vouchers that are distributed to students referred to the Clothing Bank when we don't have the correct sizes or styles in stock."

"The bank doesn't always have larger sizes in stock and middle and high school children prefer to select their own shoes," he said. "The vouchers allow students to pick out shoes, and it supplements the cost of shoes that might cost a little more. The vouchers may be used towards shoes at any of the local Big 5 locations, who all carry a good selection of shoes in this price range."

The original Shoes for Kids program was launched by two Sandia scientists in 1956 as a substitute for exchanging holiday presents among employees.

A contribution of \$25 will provide a child with good-quality shoes. Consider making a donation and print a Hearts and Soles valentine for a special person in your life or a colleague, friend or co-worker you appreciate.

HEARTS & SOLES
SHOES FOR KIDS DONATION DRIVE
February 3-14

Between July and December 2019, APS Clothing Bank distributed **1,076 pairs of shoes or vouchers** to students in urgent need. Celebrate Valentine's Day by dedicating your donation to a loved one or friend.

Your **\$25 contribution** will provide one of these children with a **quality pair of shoes.**

Visit Sandia's Community Involvement website for more details.

This year's drive runs Feb. 3-14. Employees can contact Katrina Wagner or visit the Community Involvement SharePoint site for more information. <#>